Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

THE EARTH-INHABITING SPECIES OF ASCOBOLUS

FRED J. SEAVER

(WITH PLATE 184, CONTAINING 8 FIGURES)

Most of the species of the genus *Ascobolus,* which genus is characterized by the beautiful violet color of the spores, occur on the dung of animals of various kinds. Those forms which occur on other substrata are the exception rather than the rule. A few species occur on damp soil and these are the species which are treated in the present paper.

Of the earth-inhibiting species of *Ascobolus,* one species, *Ascobolus carbonarius* P. Karst. has been frequently collected in North America. In 1905 a second species was collected by the writer on damp soil along the banks of the Iowa River. This species was referred to *Ascobolus viridis* Curr. Since that time, the same species has been frequently collected on soil in New York State. Dodge in his morphological studies of the Ascobolaceae has noted the difference in the spores of the American and European specimens and has considered the American plants a possible variety of the European species. Comparative study of the two forms has convinced the writer that they represent two distinct species. The spores of the European plants are a third larger than those of the American and have an entirely different form as shown in the accompanying illustrations. The American plants are therefore redescribed below as *Ascobolus geophilus.*

In August, 1914, a species of *Ascobolus* was collected on damp soil in woods near Yonkers, New York, which was taken to be *Ascobolus viridis* of American authors. The spores however were almost globose. At first, this was thought to be only an extreme variation of the common species. During September of the same year, similar plants were collected in considerable quantity on Staten Island where they grew on damp soil on the bank of a little pond. In all of these plants the mature spores would pass as globose. The young spores, however, are found to be slightly ellipsoid. In addition to their form the spores when mature are covered with crevices which are so deep as to give to the outside of the spore a peculiar ragged appearance. As they mature, the spores become so dark that they are almost opaque. This species is also regarded as distinct and described below as *Ascobolus subglobosus.*

In June, 1914, still another earth form had been collected which differed from any listed above in the fact that the apothecia were entirely white except the hymenium, which became darkened by the maturing spores. The spores and asci of this species were identical, so far as the writer could determine, with those of *Ascobolus carbonarius* but both color and habitat seemed to distinguish it from that species. *Ascobolus carbonarius* is restricted to burned places while this species grew on soil where there was no trace of fire. It may be that these plants represent only an albino form of *Ascobolus carbonarius* and that the white color is due to the fact that the plants have grown on an unfavorable substratum. The form is here listed as *Ascobolus albinus.* The following is a synopsis of the earth-growing species of *Ascobolus* as at present known for North America.

ASCOBOLUS Pers. in L. Syst. Nat. 1461. 1791.

Apothecia sessile, or stipitate, superficial or partially immersed in the substratum, externally smooth or pilose; hymenium concave, plane or convex; substance soft, fleshy or waxy, usually greenish; asci cylindric to clavate or subovoid, 4–8-spored; spores becoming blue or purple, fading to brown or blackish, ellipsoid to subglobose; smooth or rough; spore-roughenings very variable often consisting of crevices or cracks which give to the surface of the spore a reticulate appearance; paraphyses slender and usually adhering together in fascicles or clumps.

Type species, *Peziza stercoraria* Bull.

Plants restricted to burned areas.	1. *A. carbonarius.*
Plants not restricted to burned areas.	
Apothecia white, spores verrucose.	2. *A. albinus.*
Apothecia greenish to blackish, spores reticulate.	
Spores ellipsoid.	3. *A. geophilus.*
Spores subglobose.	4. *A. subglobosus.*

1. ASCOBOLUS CARBONARIUS P. Karst, Fungi Fennici *463*. 1866

Ascobolus atrofuscus Phill. & Plow. Grevillea **2**: 186. 1873.
Ascobolus carbonicola Boud. Bull. Bot. Soc. Fr. **24**: 310. 1877.
Phaeopezia Nuttallii Ellis & Ev. N. Am. Fungi *2908*. 1893.

Apothecia scattered or more often crowded into congested masses several cm. in diameter, at first globose or subglobose, expanding and becoming scutellate, reaching a diameter of 4–5 mm., externally yellowish-green, becoming dark-brown, coarsely granular; hymenium plane or nearly plane with the margin slightly elevated, at first greenish, becoming dotted over with the ends of the protruding asci, gradually becoming darker, finally almost black; asci clavate, gradually tapering below into a long slender stem-like base, reaching a length of 200–225 μ and a diameter of 23–27 μ, 8-spored; spores 1-seriate or crowded together so as to become partially 2-seriate, ellipsoid with the ends rather strongly narrowed, thick-walled, the ends often capped with a thickening of the epispore, giving the spore a truncate appearance, hyaline, becoming violet, finally brown or brownish-black, 20–24 × 12–14 μ including roughenings; spore-roughenings taking the form of wart-like projections, the spaces between appearing lighter, giving rise to reticulate markings; paraphyses about 3 μ in diameter and scarcely thickened above, embedded in greenish-yellow mucilaginous substance.

On burnt places and on charcoal beds.

TYPE LOCALITY: Finland.

DISTRIBUTION: New York to Iowa and West Virginia.

ILLUSTRATION: Ann. Sci. Nat. V. **10**: *pl. 5, f. 4* (as *Ascobolus viridis* Curr.); Bull. Lab. Nat. Hist. State Univ. Iowa **6**: *pl. 29, f. 1;* Bull. Torrey Club **39**: *pl. 10, f. 9, 10, 11.*

EXSICATTI: Ellis & Ev. N. Am. Fungi *2908* (as *Phaeopezia Nuttallii* Ellis & Ev.).

2. **Ascobolus albinus** sp. nov.

Apothecia gregarious, at first subglobose, expanding and becoming scutellate, reaching a diameter of 4–5 mm., externally pure white, minutely rough; hymenium plane or nearly plane, at first whitish, becoming darkened by the maturing spores; asci cylindric or subcylindric, 8-spored, reaching a length of about 200 μ and a diameter of about 25 μ; spores at first obliquely 1-seriate, becoming 2-seriate or irregularly crowded, ellipsoid, becoming purple then brown, 20–26 × 12 μ, rough; spore roughenings consisting of minute warts; paraphyses very slender, hyaline.

On damp soil in woods.

TYPE LOCALITY: Woods, near Yonkers, New York.

DISTRIBUTION: Known only from the type locality.

3. **Ascobolus geophilus** sp. nov.

Apothecia scattered, gregarious, or more rarely crowded, at first subglobose, expanding, becoming scutellate to discoid, reaching a diameter of 5 mm., externally greenish-yellow, furfuraceous to nearly smooth; hymenium plane or slightly concave, similar in color to the outside of the apothecium, roughened by the protruding asci and becoming darker as the spores mature, finally almost black; asci clavate, gradually tapering below into a stem-like base, reaching a length 200–250 μ and a diameter of 15–18 μ, 8-spored but often with only 4 spores developed; spores 1-seriate, becoming 2-seriate or irregularly crowded, ellipsoid, at first hyaline, becoming violet, then brown, 22–25 × 12–13 μ, becoming rough; spore-roughenings consisting of verrucose markings and reticulations, the reticulations consisting of light lines which give rise to an irregular net-work; paraphyses very slender, sparingly branched, reaching a diameter of 2 μ, scarcely enlarged above, embedded in golden-yellow mucilaginous substance.

On damp soil.

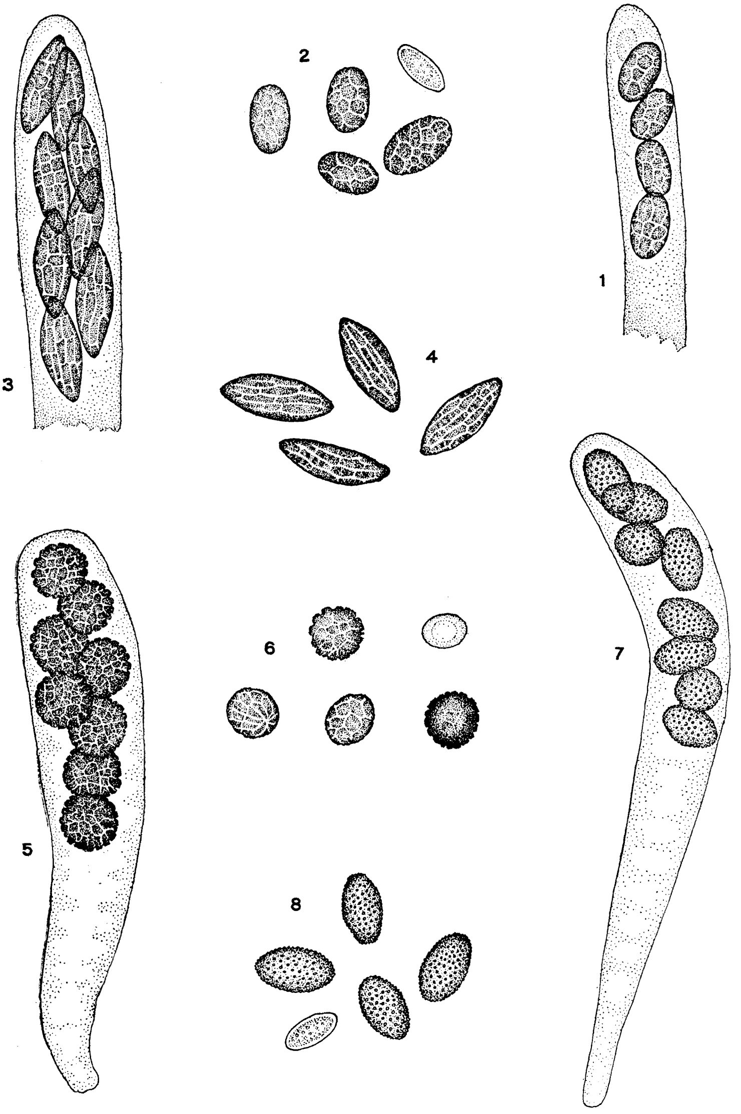
TYPE LOCALITY: Europe.

DISTRIBUTION: New York to Iowa.

ILLUSTRATIONS: Bull. Lab. Nat. Hist. State Univ. Iowa **6**: *pl. 30, f. 1.*

4. **Ascobolus subglobosus** sp. nov.

Apothecia gregarious or thickly crowded, at first nearly globose, expanding and becoming almost discoid, reaching a diameter of 3–5 mm., externally smooth, greenish-yellow; hymenium plane, convex or irregularly convolute, at first similar in color to the outside of the apothecium, becoming dotted over with the ends of the protruding asci, finally entirely black; asci subcylindric to clavate, gradually tapering below into a stem-like base, 8-spored; spores at first 1-seriate, becoming crowded and partially 2-seriate as they mature, at first hyaline and containing one oil-drop which is often surrounded by numerous smaller ones, becoming violet, finally almost black, and opaque becoming rough, reaching a diameter of 18–20 μ or 18 × 20 μ; spore-roughenings taking the form



SPECIES OF ASCOBOLUS

of numerous vein-like reticulations, which consist apparently of crevices, the spaces between the crevcies giving rise to prominent projections visible about the periphery of the spore, the spaces between appearing as notches, giving the spore a very ragged appearance; paraphyses scarcely enlarged above, embedded in golden-yellow, mucilaginous substance.

On damp soil in woods and on the margin of a small pond.

TYPE LOCALITY: Woods near Yonkers, New York.

DISTRIBUTION: Woods near Yonkers and Staten Island, New York.

NEW YORK BOTANICAL GARDEN.

EXPLANATION OF PLATE CLXXXIV

All drawings are made with the aid of the camera lucida to a common scale. 1–2, *Ascobolus geophilus* Seaver; 3–4, *Ascobolus viridis* Curr.; 5–6, *Ascobolus subglobosus* Seaver; 7–8, *Ascobolus carbonarius* P. Karst.